Exhibit 10.1
Docket 3720-WR-107
Witness: Chris Kaempfer, P.E.
July 19, 2010

Village of Greendale
Milwaukee County, Wisconsin

FLOW METER EVALUATION
SUMMARY REPORT

JULY 2010

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Project No. E164-01.04

VILLAGE OF GREENDALE
MILWAUKEE COUNTY, WISCONSIN

FLOW METER EVALUATION
SUMMARY REPORT

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INTRODUCTION

An evaluation was performed to determine the accuracy of the high service flow metering system at the Village of Greendale Booster Pump Station. The high service flow metering system is used to measure the amount of water that is pumped into the Greendale Water Distribution System from the Milwaukee Water Works Water Distribution System. The high service flow metering system is used to measure the rate of flow and the quantity of water pumped. The data from the high service flow metering system is used to determine the maximum daily pumpage that is listed in the PSC Annual Report.

EXISTING WATER SYSTEM FACILITIES

The Village of Greendale purchases water on a wholesale basis from the Milwaukee Water Works (MWW). The Village of Greendale obtains water from the MWW at two locations on West Edgerton Avenue and one location on College Avenue. One location is the primary connection point and two locations are secondary connection points. The primary connection was used to supply water to the Village of Greendale until May of 2010. The primary connection and the two secondary connections have been used to supply water to the Village of Greendale since May of 2010.

Primary Connection Point

The primary connection point is located at the corner of West Edgerton Avenue and South 60th Street. The primary connection point is supplied from the MWW Riverside Pressure District. The hydraulic grade line of the MWW Riverside Pressure District is approximately 850 feet. The primary connection supplies two ground storage reservoirs and a booster pump station through a 20-inch diameter supply main. A schematic of the booster pump station and the ground storage reservoirs is shown in Figure 1. The booster pump station and ground storage reservoirs are located at 5270 South 60th Street between Mockingbird Lane and West Upham Avenue.

The flow rate and quantity of water supplied to the ground storage reservoirs is measured by the MWW. The flow is measured at a meter station located in the lower level of the booster pump station. Two 8-inch diameter magnetic flow meters are used to measure the quantity of water purchased from MWW. The flow values from the MWW flow meters are used for billing. The values measured by the MWW flow meters are used to determine the annual and monthly amounts of water that are supplied to the Village of Greendale. The annual and monthly amounts of water that are measured by the MWW flow meters are listed in the Village of Greendale PSC Annual Report. The magnetic flow meters are owned and operated by the MWW.

The flow rate into the ground storage reservoirs is regulated by a 14-inch diameter control valve that is mounted in the 20-inch diameter supply main. The control valve is actuated by an electric valve operator. The flow control valve is located in the lower level of the booster pump station. A booster pump on the supply main is designed to fill the ground storage reservoirs if the pressure in the supply main from the MWW is reduced below 14 pounds per square inch (psi) at the meter station. One ground storage reservoir, constructed in 1965, has a capacity of 1,000,000 gallons. The second ground storage reservoir, constructed in 1974, has a capacity of 1,500,000 gallons. Both ground storage reservoirs have an overflow elevation of 844 feet above sea level. The ground storage reservoirs supply water to the booster pump station that is used to supply the Village of Greendale Water Distribution System.

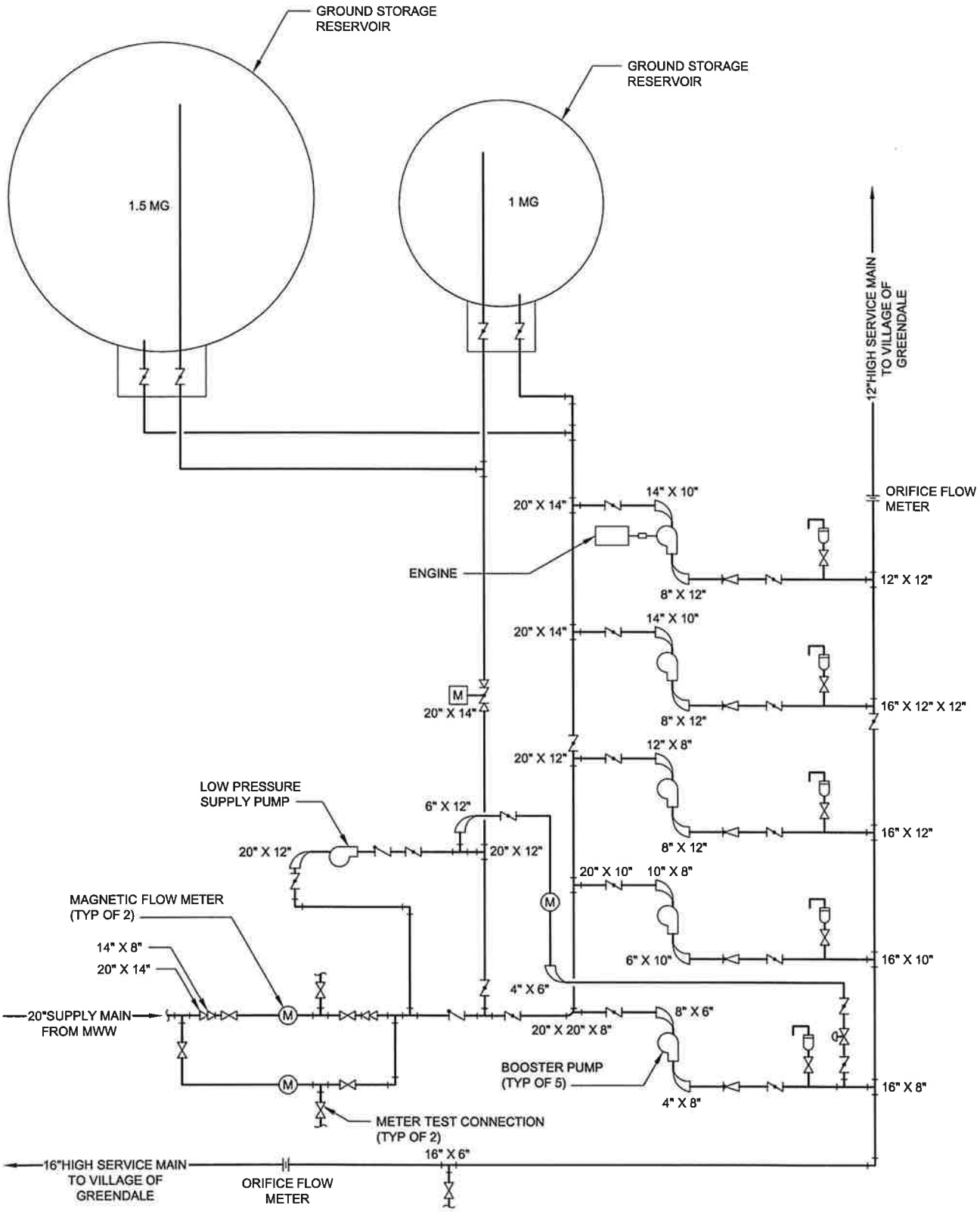


Fig. 1 Booster Pump Station and Ground Storage Reservoirs Schematic

The booster pump station was constructed in 1965 and houses five centrifugal pumps. Four of the pumps are equipped with electric motors and one pump is equipped with a natural gas fueled engine to provide emergency power. Pump No. 1 has a rated capacity of 880 gallons per minute (gpm) at a total dynamic head (TDH) of 88 feet, Pump No. 2 has a rated capacity of 1,450 gpm at a TDH of 88 feet, Pump No. 3 has a rated capacity of 2,100 gpm at a TDH of 88 feet, Pump No. 4 has a rated capacity of 2,800 gpm at a TDH of 88 feet, and Pump No. 5 has a rated capacity of 2,800 gpm at a TDH of 120 feet.

The booster pumps are used to supply water to the Village water distribution system and to fill the elevated storage tank. The booster pump station discharges to the Village water distribution system through a 16-inch diameter high service main and a 12-inch diameter high service main.

The flow rate and quantity of water discharged from the booster pump station is measured by a high service flow metering system. The high service flow metering system uses two orifice plates to measure the flow from the booster pump station. Each orifice plate is equipped with a differential pressure flow transmitter. One orifice plate is mounted in the 16-inch diameter high service main, and the second orifice plate is mounted in the 12-inch diameter high service main. The flow meters in the 16-inch and 12-inch diameter high service mains are located in the lower level of the booster pump station.

The differential pressure flow transmitters send a flow rate proportional 4-20 mA DC signal to the main control panel in the booster pump station. A programmable logic controller (PLC) in the main control panel adds the flow signals from the two flow transmitters to calculate the total flow rate discharged from the booster pump station. The PLC also totalizes the flow discharged from the booster pump station.

The booster pump station has a refill valve system that allows the two existing ground storage reservoirs to be filled from the Greendale Water Distribution System. The refill valve piping modifications were constructed in May of 2010. The refill valve is located in a pipeline that connects the 8-inch diameter discharge piping of Booster Pump No. 1 with the 20-inch diameter inlet pipeline that supplies the two ground storage reservoirs. The flow through the refill valve system is measured with a 6-inch diameter magnetic flow meter. The refill valve system is located in the lower level of the existing booster pump station.

Secondary Connection Points

The secondary connection points are located at the corner of West Edgerton Avenue and South 68th Street and at the corner of West College Avenue and South 43rd Street. A flow control station is located at each secondary connection. The flow control stations at the secondary connection points are supplied from the MWW Southwest Pressure District. The hydraulic grade line of the MWW Southwest Pressure District is approximately 940 feet. The flow control stations at the secondary connection points supply water directly to the Greendale distribution system through 12-inch diameter transmission mains. The flow is measured at each secondary connection flow control station with a 10-inch diameter magnetic flow meter. The flow control station contains a hydraulically actuated flow control valve. The flow control valve is designed to regulate the flow rate of the water entering the Greendale Water Distribution System and to prevent the elevated storage tank from overflowing. The flow control stations at the secondary connection points were placed in service in May of 2010.

The flow rate and quantity of water supplied to the Village of Greendale through the flow control stations is measured by the MWW. The 10-inch diameter magnetic flow meter in each flow control station is used to measure the quantity of water purchased from the MWW. The flow values from the MWW flow meters are used for billing. The magnetic flow meters are owned and operated by the MWW.

Elevated Storage

The water system has one 400,000 gallon elevated storage tank. The elevated storage tank was constructed in 1937. The overflow elevation of the elevated storage tank is approximately 911 feet above sea level. The elevated storage tank is a 50-foot diameter double ellipsoid tank supported by eight steel columns. The elevated storage tank has a 6-foot diameter riser. The elevated storage tank is connected to the water distribution system by a 12-inch diameter transmission main. The water level in the elevated storage tank is used by the supervisory control and data acquisition (SCADA) system to control the booster pumps and flow control station valves.

FLOW TESTING PROGRAM

A series of drawdown tests were performed to compare the flow rate values from the high service flow metering system with the flow rate values calculated from the drawdown tests. The drawdown tests were performed by isolating the ground storage reservoirs from their supply source, pumping from the reservoir, calculating the volume of water pumped by measuring the change in level, and calculating the average flow rate for the test by dividing the volume of water pumped by the pump run time. The volume of water pumped from the ground storage reservoirs was determined using gauging tables for the ground storage reservoirs. A copy of the gauging tables for the ground storage reservoirs is included in Appendix "A".

The flow testing program was performed in two phases. The first phase of the flow testing program was performed to determine if there was problem with the high service flow metering system. The first phase of the flow metering program was performed in May of 2010 when the 20-inch diameter supply main was removed from service. The second phase of the flow testing program was performed to determine the magnitude of the problem with the high service flow metering system. The second phase of the flow metering program was performed in June of 2010 after the 20-inch diameter supply main was returned to service.

Phase 1 Flow Testing Program

The first phase of the flow testing program was performed by comparing the flow rate value from the high service flow metering system with the flow rate calculated from the daily pumpage from Booster Pump No. 1. The supply main that feeds the ground storage reservoirs had been removed from service in May of 2010 to allow the MWW to modify their transmission main system. The only means of supplying the ground storage reservoirs during the test period was the refill valve system. The refill valve system allows the ground storage reservoirs to be filled from the Greendale Water Distribution System. The refill valve system was operated from 10:00 p.m. to 6:00 a.m. six days a week. The booster pump was operated every second or third day for an 8 to 9-hour period starting at 7:00 a.m. and ending at 3:00 or 4:00 p.m. The refill valve system was never operated while the booster pump was operated.

The results of the Phase 1 Flow Testing Program are summarized in Table 1. The results of the Phase 1 Testing Program indicate the flow rates indicated by the high service flow metering system are approximately 175 percent of the flow rates calculated from drawdown tests. The results of the evaluation indicate the actual flow rates are approximately 56 percent of the flow rates indicated by the high service flow metering system when operating at low flow rates.

Table 1 Phase 1 Flow Testing Program Results

	Drawdown in Reservoir		Booster Pump No. 1		Metering System	
Date	Level (ft)	Volume[(a)] (gal)	Run Time Hours	Flow Rate (gpm)	Flow Rate (gpm)	Flow Ratio System to Calculated
05/06/09						
05/07/09	4.8	474,587	8.0	989	1505	1.52
05/08/09						
05/09/09						
05/10/09	4.4	435,944	9.0	807	1498	1.86
05/11/09						
05/12/09	3.7	362,857	7.0	864	1505	1.74
05/13/09						
05/14/09	4.4	425,019	8.5	833	1529	1.83
05/15/09						
05/16/09						
05/17/09	4.3	413,113	8.1	850	1547	1.82
05/18/09						
05/19/09	4.7	447,380	8.7	857	1564	1.82
05/20/09						
05/21/09	2.6	259,969	5.5	788	--	
05/22/09						
05/23/09			0.1			
05/24/09	4.1	399,263	8.4	792	1398	1.76
05/25/09						
05/26/09	3.9	376,358	8.3	756	1408	1.86
05/27/09			1.8			
05/28/09	3.7	357,076	7.7	773	1397	1.81
05/29/09						
05/30/09			SCADA Out-of-Service			
05/31/09	3.3	308,597	SCADA Out-of-Service			
06/01/09	2.9	277,382	5.7	811	1427	1.76

(a) Estimated using Gauging Table

Phase 2 Flow Testing Program

The second phase of the flow testing program was performed by comparing the flow rate values from the high service flow metering system with the flow rates calculated from a drawdown data and run time data from Booster Pumps No. 2, No. 3, and No. 4. The inlet values to the ground storage reservoirs were closed to isolate the reservoirs from their source of supply, each booster pump was operated to produce a one (1) foot drawdown in the ground storage reservoirs, and the average pumping rate was calculated. A copy of the Booster Pump Drawdown Testing Plan is included in Appendix "B". A drawdown test was performed for each booster pump. Using Booster Pumps No. 2, No. 3, and No. 4 allowed the high service flow metering system to be evaluated at medium and high flow rates.

The results of the Phase 2 Flow Testing Program are summarized in Table 2. The results of the Phase 2 Testing Program indicate the flow rates indicated by the high service flow metering system are approximately 160 percent of the flow rates calculated from the drawdown tests. The results of the evaluation indicate the actual flow rates are approximately 62 percent of the flow rates indicated by the high service flow metering system when operating at medium and high flow rates.

Table 2 Phase 2 Flow Testing Program Results

Booster Pump Number	Reservoir Level		Volume Pumped (gallons)	Test Time (minutes)	Calculated Flow Rate (gpm)	Metering System Flow Rate (gpm)	Flow Ratio System to Calculated
	Test Start (ft)	Test Stop (ft)					
2	17.5	16.5	101,676	72	1,412	2,250	1.59
3	16.5	15.5	103,032	48	2,147	3,375	1.57
4	20.3	19.3	96,367	39	2,471	3,950	1.60

FLOW METERING SYSTEM EVALUATION

An evaluation of the high service flow metering system was performed to determine the reason or reasons the system was not providing accurate results. The high service flow metering system consists of two orifice plates. Each orifice plate is equipped with a flow transmitter. One orifice plate is mounted in the 16-inch diameter high service water main and one orifice plate is mounted in the 12-inch diameter high service main. The flow transmitter takes the differential pressure generated by the orifice plate and converts it to a flow rate signal. The flow rate from each flow transmitter is sent to the SCADA system as a 4-20 mA DC signal that is proportional to flow rate. The SCADA system converts the 4-20 mA DC input signal to a digital signal for processing. The digital signal is scaled to a flow rate. The two flow rates are then added to produce a single flow rate for the booster pump station. The flow rate signal is integrated to determine the total flow pumped each day.

The orifice plate on the 16-inch diameter high service water main has a diameter of 9.011 inches and is designed to produce a differential of 202.5 inches of water column at maximum flow. The calibration tag for the orifice indicates the maximum flow rate for the orifice is 8,333 gpm (12.0 million gallons per day (mgd)). The flow transmitter is scaled to produce an output of 20 mA DC at a differential of 202.5 inches of water column.

The orifice plate on the 12-inch diameter high service water main has a diameter of 8.042 inches and is designed to produce a differential of 100 inches of water column at maximum flow. The calibration tag for the orifice indicates the maximum flow rate for the orifice is 4,167 gpm (6.0 mgd). The flow transmitter is scaled to produce an output of 20 mA DC at a differential pressure of 100 inches of water column.

The maximum flow capacity of the orifice plates was checked using a series of mathematical formulas, graphs, and nomographs to determine if the meters were correctly calibrated. The results of the analysis indicate the orifice in the 16-inch diameter transmission main should have been calibrated for a maximum flow of approximately 4,210 gpm (6.06 mgd) and the orifice in the 12-inch diameter transmission main should have been calibrated for a maximum flow of approximately 2,395 gpm (3.45 mgd). It appears that the flow meters were calibrated to indicate 189 percent of the actual flow. The actual flow rate is only 53 percent of the value indicated by the flow meter.

The flow transmitters have a meter that indicates the output of the unit in percent of full scale. The readings were recorded during the Phase 2 drawdown tests. The actual flow can be calculated by multiplying the percent of full scale by the flow rate at the maximum differential. The results of the calculations are summarized in Table 3.

Table 3 Flow Meter Corrected Readings

Booster Pump	16" Flow Meter		12" Flow Meter		Flow Total, gpm
	Percent	Flow, gpm	Percent	Flow, gpm	
2	21	884	22	546	1,430
3	32	1,346	31	769	2,115
4	38	1,599	37	918	2,517

The corrected flow rate readings from the flow meter were compared with the flow rate calculations from the Phase 2 drawdown tests. The results are summarized in Table 4. The comparison indicates there is very good agreement between the two methods of calculating the flow rate for the testing program. The two methods produce results that are within 2 percent of each other.

Table 4 Calculated and Corrected Flow Rate Comparison

Booster Pump	Calculated Flow Rate, gpm	Corrected Flow Rate, gpm	Calculated/Corrected Ratio
2	1,412	1,430	0.9874
3	2,147	2,115	1.0151
4	2,471	2,517	0.9817

SUMMARY

A Flow Testing Program and a Flow Metering System Evaluation were performed to determine the accuracy of the high service flow metering system at the Village of Greendale Booster Pump Station. The results of the Flow Testing Program indicate the high service flow metering system is not providing accurate results. The results of the Flow Meter System Evaluation indicate the actual flow rates are approximately 62 percent of the values indicated by the high service flow metering system. The corrected flow rate values were almost identical to the Phase 2 drawdown flow rate values. The results of the Flow Metering System Evaluation indicate the problem with the high service flow metering system was primarily the result of improper calibration of the signal from the flow transmitters.

RECOMMENDATIONS

It is not known how long the high service flow metering system has been improperly calibrated. It appears that the problem is at least 10 years old and that the maximum day demands reported in the PSC Annual Reports for at least the past nine years are not accurate. We recommend that maximum day demand values for the past nine years be revised to provide a true indication of the maximum day demands of the Village of Greendale.

The average annual water supplied and the maximum day demand values that have been used in the PSC Annual Reports for 2001 through 2009 are summarized in Table 5. The corrected maximum day demands were calculated by multiplying the measured maximum day demand by 0.62 (62 percent). The results of the correction are summarized in the third column of Table 5.

The ratio of maximum day flow to annual average water supplied for the measured maximum day value and the corrected maximum day value are summarized in the last two columns of Table 5. The ratio of measured maximum day demand to annual average water supplied ranged from a minimum of 2.48 to a maximum of 3.44. These are very high values for a community of 16,000 persons. Communities of this size would normally be expected to have a maximum ratio of 2.00 to 2.50. The

corrected ratio of maximum day demand to average water supplied ranged from a minimum of 1.54 to a maximum of 2.13. These ratios appear to be much more appropriate for a community the size of the Village of Greendale. We recommend that the corrected values be used in the Water Supply Study and a maximum ratio of 2.20 be used for planning purposes.

Table 5 Summary of Maximum Day Demand Data

	Demand, mgd			Maximum Day Ratio	
Year	Average Annual Water Supplied	Maximum Day Measured	Maximum Day Corrected	Measured to Supplied	Corrected to Supplied
2001	1.441	4.110	2.548	2.85	1.77
2002	1.544	5.152	3.194	3.34	2.07
2003	1.547	5.320	3.298	3.44	2.13
2004	1.384	3.943	2.445	2.85	1.77
2005	1.534	4.580	2.840	2.99	1.85
2006	1.422	3.526	2.186	2.48	1.54
2007	1.377	3.986	2.471	2.89	1.79
2008	1.401	4.245	2.632	3.03	1.88
2009	1.156	3.955	2.452	3.42	2.12

We recommend the orifice plate flow metering system be replaced with a magnetic-type flow metering system as a long-term solution. A magnetic-type flow metering system would improve the high service flow metering system accuracy and would provide local flow indication and local flow totalization. We recommend the orifice plate flow metering system be recalibrated as a short-term solution. The orifice plate flow meter used for the 16-inch diameter high service main should be recalibrated for a range of 0 to 6.0 mgd. The orifice plate flow meter used for the 12-inch diameter high service main should be recalibrated for a range of 0 to 3.5 mgd.

APPENDIX "A"

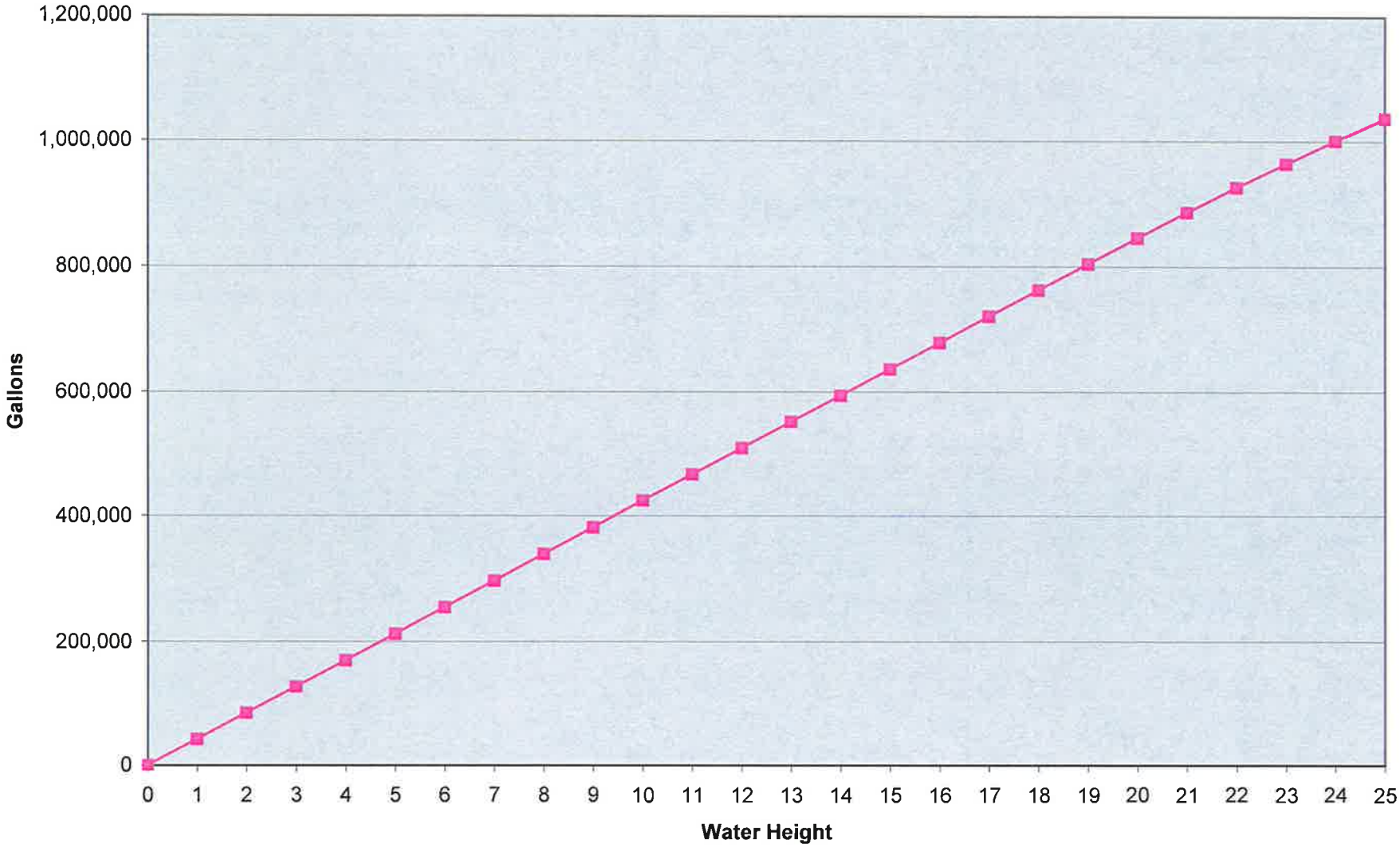
GROUND STORAGE RESERVOIR GAUGING TABLES

Kaempfer & Associates, Inc.
Consulting Engineers
P.O. Box 150 650 East Jackson St.
Oconto Falls, Wisconsin 54154

PROJECT			
Village of Greendale – Water Study			
SUBJECT			
1.0 Million Gallon Ground Storage Reservoir Gauging Table			
JOB NO.	DATE	BY	SHEET
E164-03.02	4/22/10	JH	1 of 1

Water height in tank (ft)	Volume (gal)
0	0
1	42,427
2	84,853
3	127,280
4	169,707
5	212,134
6	254,560
7	296,987
8	339,414
9	381,840
10	424,267
11	466,694
12	509,120
13	551,547
14	593,974
15	636,401
16	678,804
17	721,071
18	763,064
19	804,643
20	845,664
21	885,975
22	925,419
23	963,823
24	1,000,999
25	1,036,737

1.0 MG Ground Storage Reservoir Gauging Table



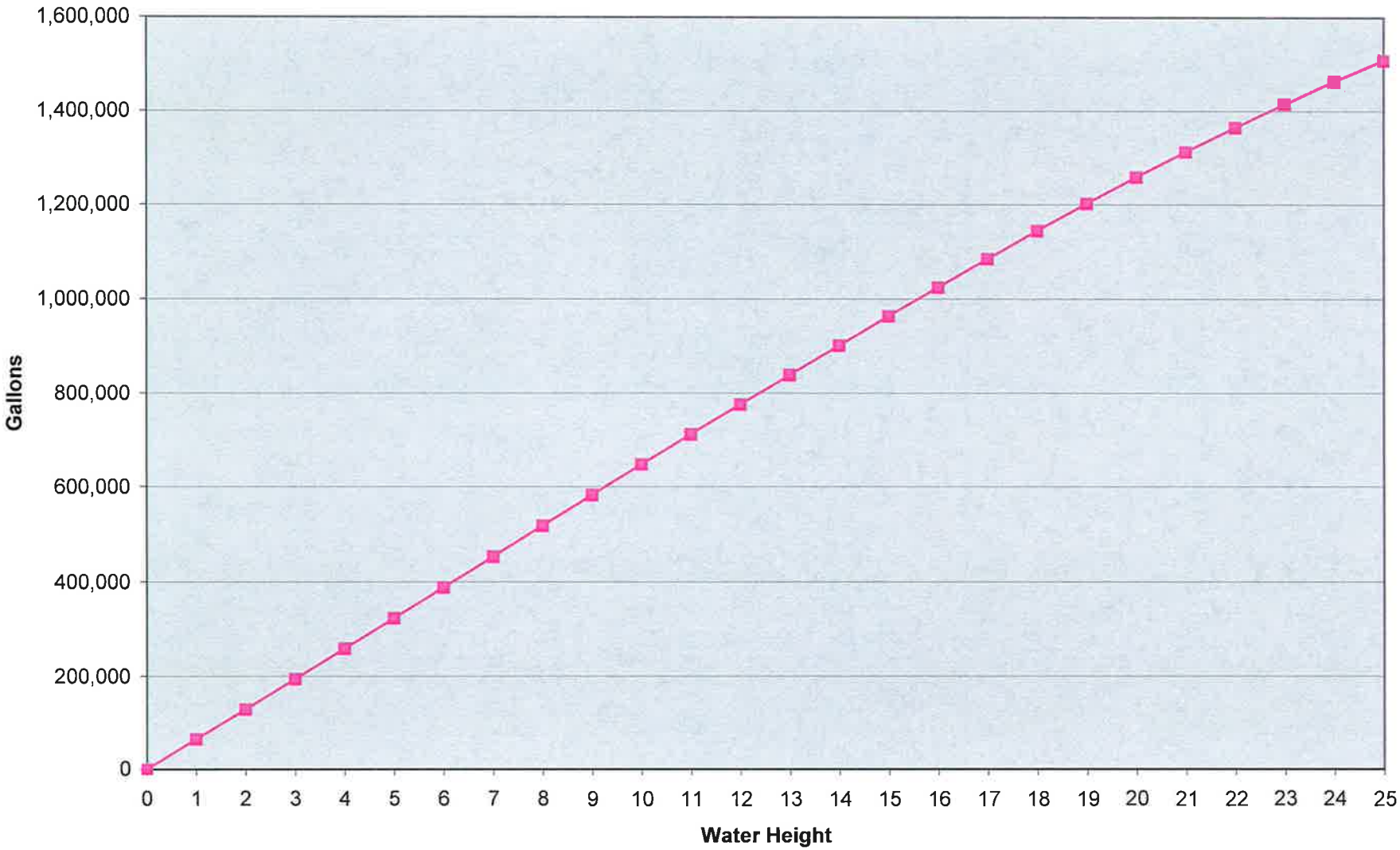
K:\E164\03\02\MISC\Greendale Gauging Table

Kaempfer & Associates, Inc.
Consulting Engineers
P.O. Box 150 650 East Jackson St.
Oconto Falls, Wisconsin 54154

PROJECT			
Village of Greendale – Water Study			
SUBJECT			
1.5 Million Gallon Ground Storage Reservoir Gauging Table			
JOB NO.	DATE	BY	SHEET
E164-03.02	4/22/10	JH	1 of 1

Water height in tank (ft)	Volume (gal)
0	0
1	64,741
2	129,482
3	194,223
4	258,964
5	323,705
6	388,447
7	453,188
8	517,929
9	582,630
10	647,227
11	711,575
12	775,552
13	839,028
14	901,875
15	963,960
16	1,025,210
17	1,085,353
18	1,144,302
19	1,201,898
20	1,257,972
21	1,312,334
22	1,364,777
23	1,415,095
24	1,462,938
25	1,507,984

1.5 MG Ground Storage Reservoir Gauging Table



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Kaempfer & Associates, Inc.
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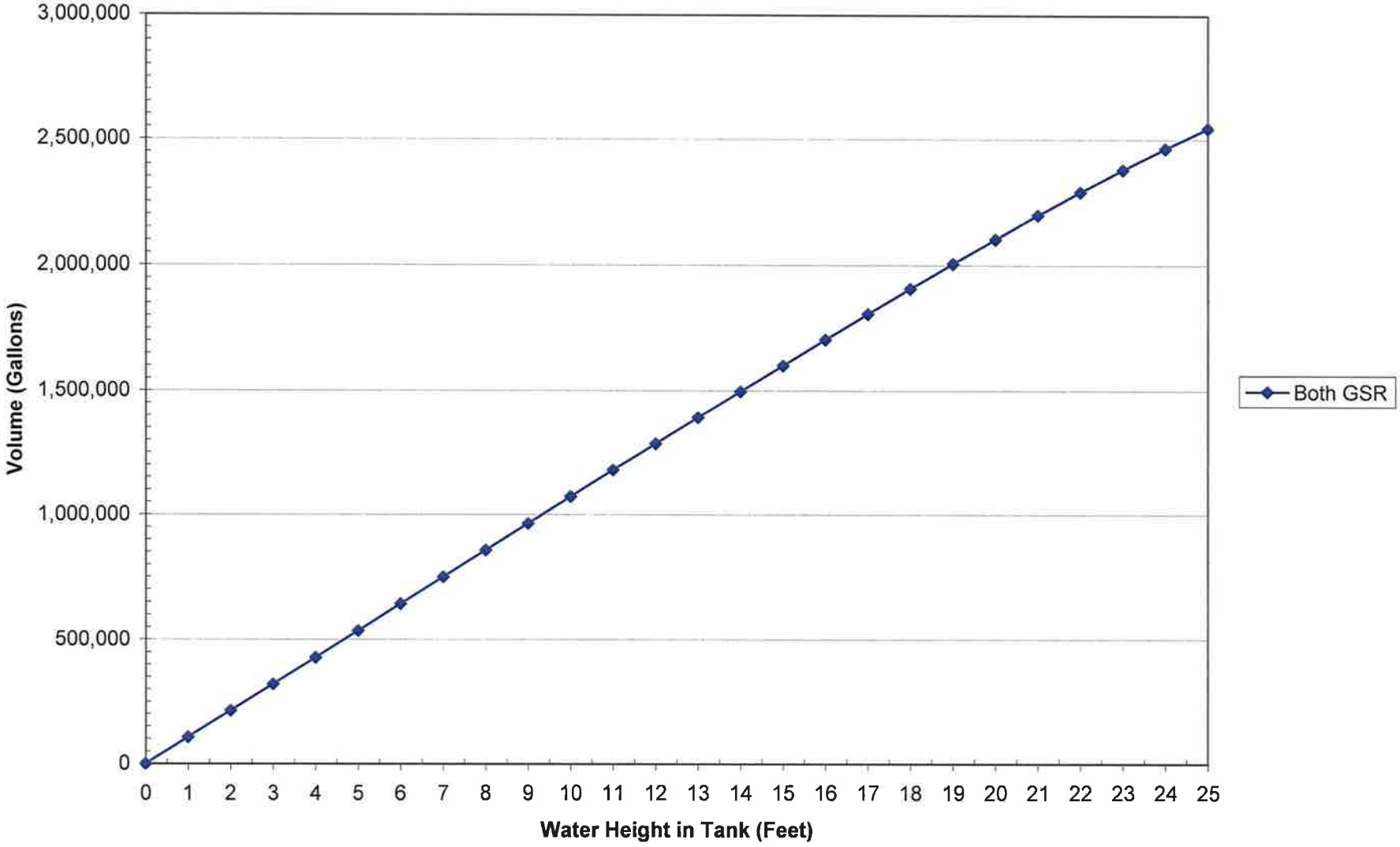
Oconto Falls, Wisconsin 54154

PROJECT			
Village of Greendale – Water Study			
SUBJECT			
Ground Storage Reservoir Composite Gauging Table			
JOB NO.	DATE	BY	SHEET
E164-03.02	4/22/10	JH	1 of 1

Water height in tank (ft)	Volume (gal)
0	0
1	107,168
2	214,336
3	321,503
4	428,671
5	535,839
6	643,007
7	750,175
8	857,342
9	964,470
10	1,071,494
11	1,178,269
12	1,284,672
13	1,390,575
14	1,495,849
15	1,600,360
16	1,704,014
17	1,806,423
18	1,907,366
19	2,006,541
20	2,103,635
21	2,198,309
22	2,290,196
23	2,378,918
24	2,463,938
25	2,544,720

Gauging Table



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P.O. Box 150 650 East Jackson St.
Oconto Falls, Wisconsin 54154

PROJECT			
Village of Greendale – Water Study			
SUBJECT			
Ground Storage Reservoir Composite Gauging Table			
JOB NO.	DATE	BY	SHEET
E164-03.02	4/26/10	JH	1 of 2

Water height in tank (ft)	Volume (gal)	Water height in tank (ft)	Volume (gal)	Water height in tank (ft)	Volume (gal)
0.0	0	4.7	503,689	9.4	1,007,280
0.1	10,717	4.8	514,405	9.5	1,017,982
0.2	21,434	4.9	525,122	9.6	1,028,684
0.3	32,150	5.0	535,839	9.7	1,039,387
0.4	42,867	5.1	546,556	9.8	1,050,089
0.5	53,584	5.2	557,273	9.9	1,060,791
0.6	64,301	5.3	567,989	10.0	1,071,494
0.7	75,017	5.4	578,706	10.1	1,082,171
0.8	85,734	5.5	589,423	10.2	1,092,849
0.9	96,451	5.6	600,140	10.3	1,103,526
1.0	107,168	5.7	610,856	10.4	1,114,204
1.1	117,885	5.8	621,573	10.5	1,124,881
1.2	128,601	5.9	632,290	10.6	1,135,559
1.3	139,318	6.0	643,007	10.7	1,146,236
1.4	150,035	6.1	653,724	10.8	1,156,914
1.5	160,752	6.2	664,440	10.9	1,167,592
1.6	171,468	6.3	675,157	11.0	1,178,269
1.7	182,185	6.4	685,874	11.1	1,188,909
1.8	192,902	6.5	696,591	11.2	1,199,550
1.9	203,619	6.6	707,307	11.3	1,210,190
2.0	214,336	6.7	718,024	11.4	1,220,830
2.1	225,052	6.8	728,741	11.5	1,231,471
2.2	235,769	6.9	739,458	11.6	1,242,111
2.3	246,486	7.0	750,175	11.7	1,252,751
2.4	257,203	7.1	760,891	11.8	1,263,391
2.5	267,919	7.2	771,608	11.9	1,274,032
2.6	278,636	7.3	782,325	12.0	1,284,672
2.7	289,353	7.4	793,042	12.1	1,295,262
2.8	300,070	7.5	803,758	12.2	1,305,853
2.9	310,787	7.6	814,475	12.3	1,316,443
3.0	321,503	7.7	825,192	12.4	1,327,033
3.1	332,220	7.8	835,909	12.5	1,337,624
3.2	342,937	7.9	846,626	12.6	1,348,214
3.3	353,654	8.0	857,342	12.7	1,358,804
3.4	364,370	8.1	868,055	12.8	1,369,394
3.5	375,087	8.2	878,768	12.9	1,379,985
3.6	385,804	8.3	889,481	13.0	1,390,575
3.7	396,521	8.4	900,194	13.1	1,401,102
3.8	407,238	8.5	910,906	13.2	1,411,630
3.9	417,954	8.6	921,619	13.3	1,422,157
4.0	428,671	8.7	932,332	13.4	1,432,685
4.1	439,388	8.8	943,045	13.5	1,443,212
4.2	450,105	8.9	953,758	13.6	1,453,739
4.3	460,822	9.0	964,470	13.7	1,464,267
4.4	471,538	9.1	975,173	13.8	1,474,794
4.5	482,255	9.2	985,875	13.9	1,485,321
4.6	492,972	9.3	996,577	14.0	1,495,849

Kaempfer & Associates, Inc.
Consulting Engineers
P.O. Box 150 650 East Jackson St.
Oconto Falls, Wisconsin 54154

PROJECT			
Village of Greendale – Water Study			
SUBJECT			
Ground Storage Reservoir Composite Gauging Table			
JOB NO.	DATE	BY	SHEET
E164-03.02	4/26/10	JH	2 of 2

Water height in tank (ft)	Volume (gal)	Water height in tank (ft)	Volume (gal)	Water height in tank (ft)	Volume (gal)
14.1	1,506,300	18.8	1,986,706	23.5	2,421,428
14.2	1,516,751	18.9	1,996,624	23.6	2,429,930
14.3	1,527,202	19.0	2,006,541	23.7	2,438,432
14.4	1,537,653	19.1	2,016,251	23.8	2,446,934
14.5	1,548,104	19.2	2,025,960	23.9	2,455,436
14.6	1,558,556	19.3	2,035,670	24.0	2,463,938
14.7	1,569,007	19.4	2,045,379	24.1	2,472,016
14.8	1,579,458	19.5	2,055,088	24.2	2,480,094
14.9	1,589,909	19.6	2,064,798	24.3	2,488,172
15.0	1,600,360	19.7	2,074,507	24.4	2,496,251
15.1	1,610,726	19.8	2,084,216	24.5	2,504,329
15.2	1,621,091	19.9	2,093,926	24.6	2,512,407
15.3	1,631,456	20.0	2,103,635	24.7	2,520,486
15.4	1,641,822	20.1	2,113,103	24.8	2,528,564
15.5	1,652,187	20.2	2,122,570	24.9	2,536,642
15.6	1,662,553	20.3	2,132,037	25.0	2,544,720
15.7	1,672,918	20.4	2,141,505		
15.8	1,683,283	20.5	2,150,972		
15.9	1,693,649	20.6	2,160,440		
16.0	1,704,014	20.7	2,169,907		
16.1	1,714,255	20.8	2,179,375		
16.2	1,724,496	20.9	2,188,842		
16.3	1,734,737	21.0	2,198,309		
16.4	1,744,978	21.1	2,207,498		
16.5	1,755,219	21.2	2,216,687		
16.6	1,765,460	21.3	2,225,875		
16.7	1,775,701	21.4	2,235,064		
16.8	1,785,942	21.5	2,244,253		
16.9	1,796,182	21.6	2,253,441		
17.0	1,806,423	21.7	2,262,630		
17.1	1,816,518	21.8	2,271,819		
17.2	1,826,612	21.9	2,281,008		
17.3	1,836,706	22.0	2,290,196		
17.4	1,846,800	22.1	2,299,068		
17.5	1,856,895	22.2	2,307,941		
17.6	1,866,989	22.3	2,316,813		
17.7	1,877,083	22.4	2,325,685		
17.8	1,887,177	22.5	2,334,557		
17.9	1,897,271	22.6	2,343,430		
18.0	1,907,366	22.7	2,352,302		
18.1	1,917,283	22.8	2,361,174		
18.2	1,927,201	22.9	2,370,046		
18.3	1,937,118	23.0	2,378,918		
18.4	1,947,036	23.1	2,387,420		
18.5	1,956,954	23.2	2,395,922		
18.6	1,966,871	23.3	2,404,424		
18.7	1,976,789	23.4	2,412,926		

APPENDIX "B"

BOOSTER PUMP DRAWDOWN TESTING PLAN

GREENDALE WATER UTILITY
BOOSTER PUMP DRAWDOWN TESTING PLAN

Date: June 16, 2010 E164-01.03

Thursday 6/17/10

- Place the Hand-Off-Auto selector switch for the Reservoir Control Valve V-6 in the Off position.
- Place the Hand-Off-Auto selector switches for BP-1, BP-2, BP-3, and BP-4 in the Off position.
- Close the 1.5 MG ground storage reservoir outlet valve V-9.
- Close isolating valves V-21 and V-22.
- Perform drawdown test for booster Pump BP-2
  - Check water level in ground storage reservoir. Estimate volume for a 1'-0 drawdown.
  - Check water level in elevated storage tank. Determine if adequate demand and volume is available to prevent overflow. Open fire hydrant if more demand is required.
  - Close discharge control valve CV-2
  - Record water level in the 1.0 MG ground storage reservoir.
  - Place the Hand-Off-Auto selector switch in the Hand position.
  - Record the start time.
  - Record the suction and discharge pressure.
  - Slowly open discharge control valve CV-2.
  - Pump one (1) foot of water out of the 1.0 MG ground storage reservoir. Record flow rate indicated by the SCADA system, and suction and discharge pressures.
  - Slowly close discharge control valve CV-2 and record the water level in the reservoir.
  - Place the Hand-Off-Auto selector switch for BP-2 in the Off position.
  - Record the stop time.
  - Calculate average flow rate - gallons/operating time.
- Perform drawdown test for booster Pump BP-3
  - Check water level in ground storage reservoir. Estimate volume for a 1'-0 drawdown.
  - Check water level in elevated storage tank. Determine if adequate demand and volume is available to prevent overflow. Open fire hydrant if more demand is required.
  - Close BP-3 discharge control valve CV-3
  - Record water level in the 1.0 MG ground storage reservoir.
  - Place the Hand-Off-Auto selector switch in the Hand position.
  - Record the start time.
  - Record the suction and discharge pressure.
  - Slowly open discharge control valve CV-3.
  - Pump one (1) foot of water out of the 1.0 MG ground storage reservoir. Record flow rate indicated by the SCADA system, and suction and discharge pressures.

- Slowly close discharge control valve CV-3 and record the water level in the reservoir.
- Place the Hand-Off-Auto selector switch for BP-3 in the Off position.
- Record the stop time.
- Calculate average flow rate - gallons/operating time.

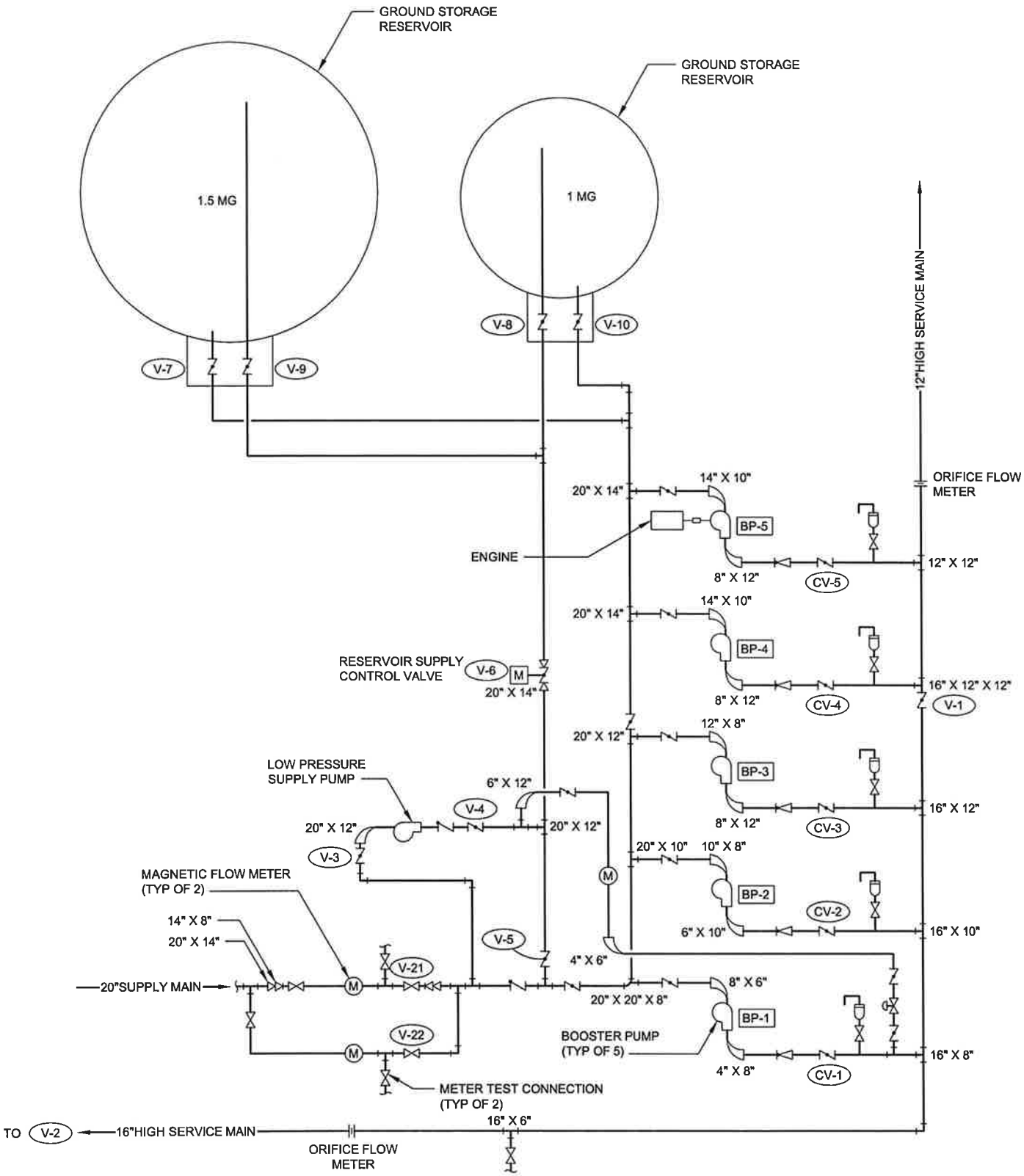
- Perform drawdown test for booster Pump BP-4
  - Check water level in ground storage reservoir. Estimate volume for a 1'-0 drawdown.
  - Check water level in elevated storage tank. Determine if adequate demand and volume is available to prevent overflow. Open fire hydrant if more demand is required.
  - Close BP-4 discharge control valve CV-4
  - Record water level in the 1.0 MG ground storage reservoir.
  - Place the Hand-Off-Auto selector switch in the Hand position.
  - Record start time.
  - Record the suction and discharge pressure.
  - Slowly open discharge control valve CV-4.
  - Pump one (1) foot of water out of the 1.0 MG ground storage reservoir. Record flow rate indicated by the SCADA system, and the suction and discharge pressures.
  - Slowly close discharge control valve CV-4 and record the water level in the reservoir.
  - Place the Hand-Off-Auto selector switch for BP-4 in the Off position.
  - Record stop time.
  - Calculate average flow rate - gallons/operating time.

- Open the 1.5 MG ground storage reservoir outlet valve V-9.

- Place the Hand-Off-Auto selector switch for the Reservoir Control Valve V-6 in the Auto position.

- Place the Hand-Off-Auto selector switches for BP-1, BP-2, BP-3 and BP-4 in the Auto position.

- Open isolating valves V-21 and V-22.



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Booster Pump Station Drawdown Test